

NAME: DEEPTHI ETOEDGHEA AUSTIN

DEPARTMENT: COMPUTER ENGINEERING

MATRIC ID: 16/B1602/048

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

$$f(x) = e^{-0.5x} (4-x)^{-2}$$

$$f'(x) = u = e^{-0.5x} = 4-x$$

$$f'(x) = \frac{dy}{dx} = v \frac{du}{dx} + u \frac{dv}{dx}$$

$$f'(x) = (4-x)(-0.5e^{-0.5x}) + e^{-0.5x}(-1)$$

$$f'(x) = 0.5e^{-0.5x}(x-4) - e^{-0.5x}$$

$$x_{n+1} = x_n - \frac{e^{-0.5x_n} (4-x_n)^{-2}}{0.5e^{-0.5x_n} (x_n-4) - e^{-0.5x_n}}$$

n	x	f
0	0.5	0
1	0.838890606	40.39949299
2	0.8849539809	5.205386079
3	0.8852086091	0.0847444021
4	0.885208602	

$$x_{n+1} = \frac{0.5 - e^{-0.5(0.5)} (4-0.5)^{-2}}{e^{-0.5(0.5)} (0.5-4) - e^{-0.5(0.5)}} = 0.838890606$$

$$\% \text{ error} = \left| \frac{x_{n+1} - x_n}{x_{n+1}} \right| \times 100\%$$

$$= \left| \frac{0.838890606 - 0.5}{0.838890606} \right| \times 100 = 40.3994$$

$$X_2 = 0.838890606 = e^{-0.5(0.838890606)} (4 - 0.838890606) - 0.5 e^{-0.5(0.838890606)} (0.838890606)$$

$$= 0.8849559809$$

$$E_a = \left| \frac{0.8849559809 - 0.838890606}{0.8849559809} \right| \times 100$$

$$\Rightarrow 5.253386019$$

$$X_3 = 0.8849559809 = e^{-0.5(0.8849559809)} (4 - 0.8849559809) - 0.5 e^{-0.5(0.8849559809)} (0.8849559809)$$

$$= 0.8859086091$$

$$\Sigma_a = \left| \frac{0.8859086091 - 0.8849559809}{0.8859086091} \right| \times 100$$

$$\Rightarrow 0.8497449061$$

$$X_4 = 0.8857086071 - e^{-0.5t(0.8857086071)} (4 - 0.8857086071) - 2 \cdot 0.5^{-0.5(0.8857086071)} (0.8857086071 - 4) - e^{0.5t(0.88568671)}$$

$$= 0.885708802$$

$$= 2.20497495 \times 10^{-5}$$

$$X_6 = 0.88708802 - e^{-0.5t(0.88708802)} (4 - 0.885708802) - 2 \cdot 0.5 e^{-0.5t(0.88708802)} (0.883708802 - 4) - e^{0.5t(0.88708802)}$$

$$= 0.885708802$$

Σa

$$\Sigma a = \left| \frac{0.885708802 - 0.885708802}{0.885708802} \right| \times 100$$

$$= 0$$